United States Patent

Motoyama et al.

[15] **3,696,217**

[45] **Oct. 3, 1972**

[54] **DEVICE USING A RECORDING JACK FOR PREVENTING ERASURE OF RECORDED INFORMATION FROM MAGNETIC TAPE IN A TAPE RECORDER**

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Aug. 14, 1969 Japan.....44/63882

[52] **U.S. Cl.**.....**179/100.2 D,** 179/100.1 DR, 179/100.2 CA, 200/162

[51] **Int. Cl.**.....**G11b 5/54,** G11b 15/04

[58] **Field of Search**....179/100.2 D, 100.1 DR, 100.2 S,179/100.2 CA; 317/157.51; 335/284; 200/162, 61.58; 274/4 A, 4 D

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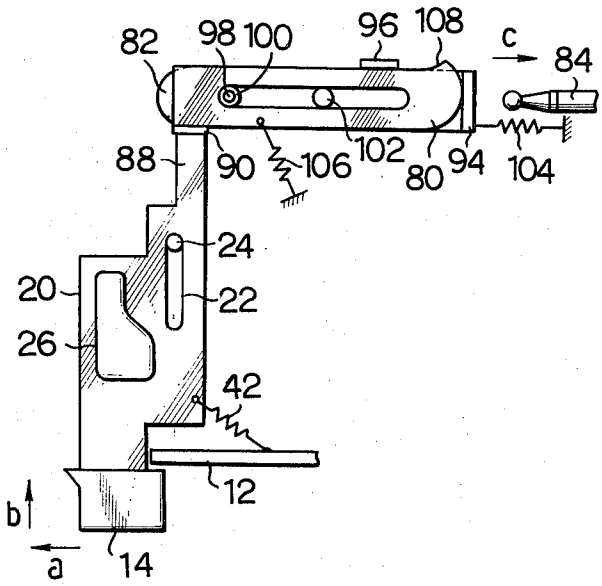
[57] **ABSTRACT**

A device for preventing information recorded on the magnetic tape of a tape recorder from being inadvertently erased. The device comprises a first slidable lever having an erasing head, a second slidable lever having a recording and reproducing head for selective movement together with said first lever for recording, or, independently of the first lever, a slidable stop lever for releasing and returning the first and second lever to their initial inoperative positions and locking mechanism for locking the first lever and being controlled and released by a recording jack or recording and reproducing connector.

8 Claims, 12 Drawing Figures



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SHEET 1 OF 5

Fig - 1

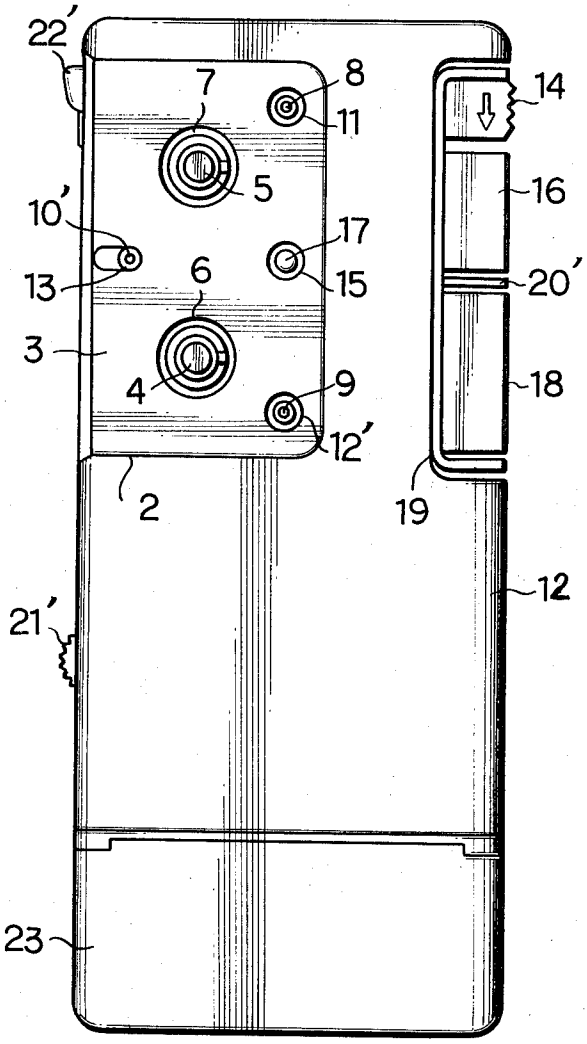

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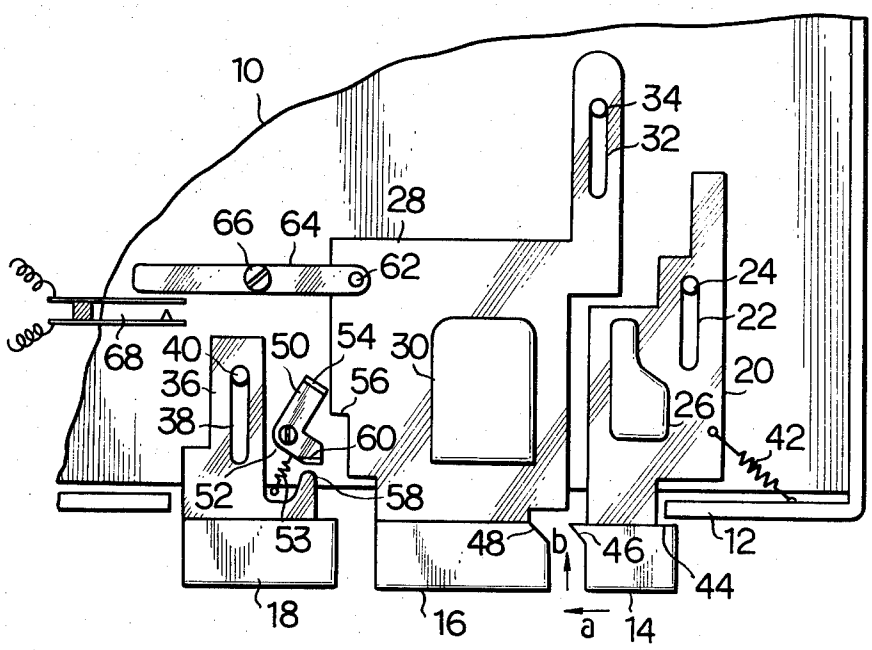
Fig - 2



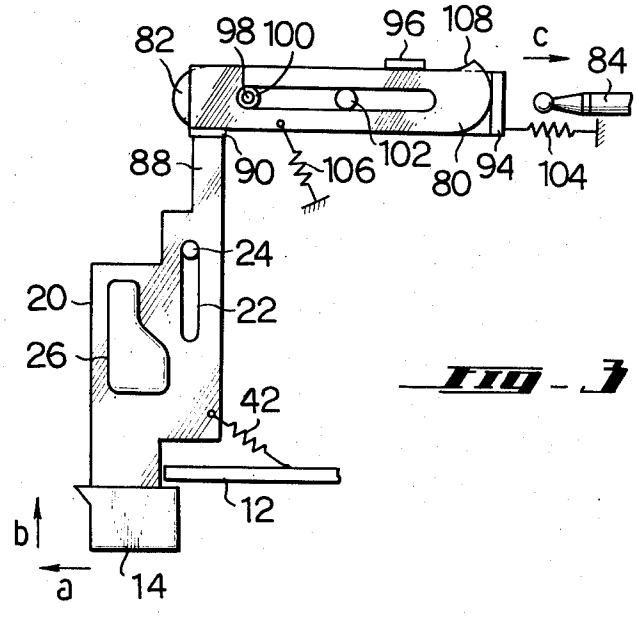


Fig - 3

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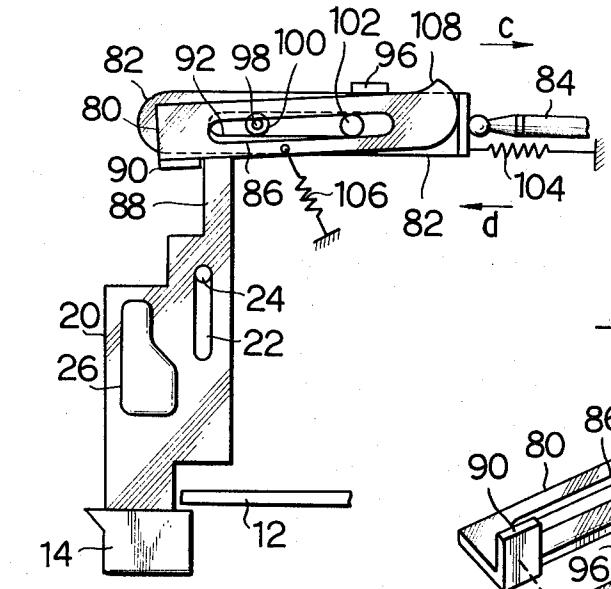

Fig. 4

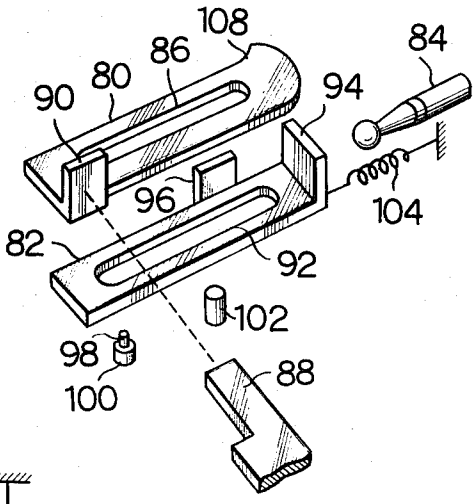

Fig. 5

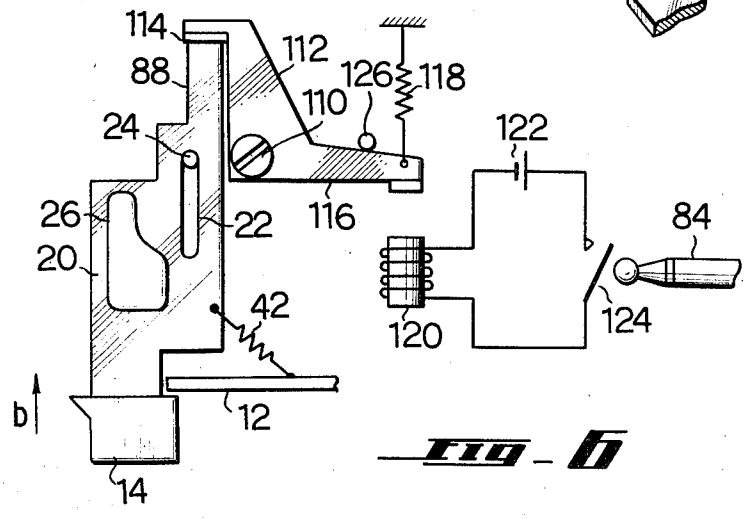

Fig. 6

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Fig. 7

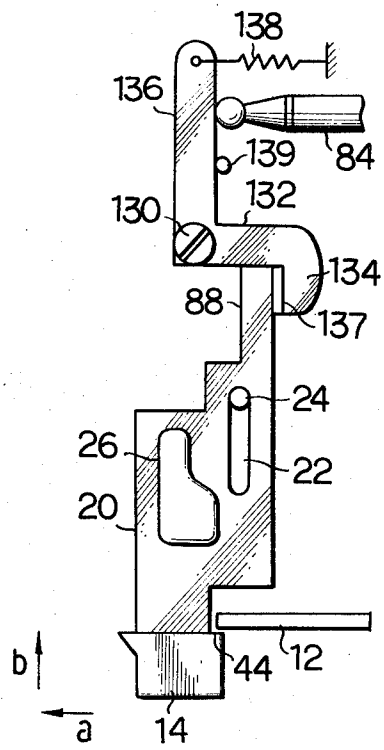


Fig. 8

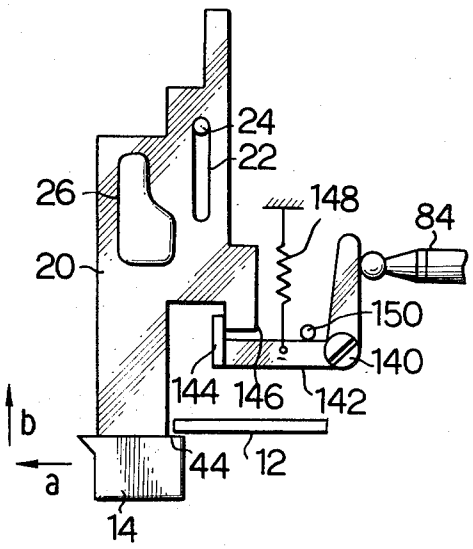
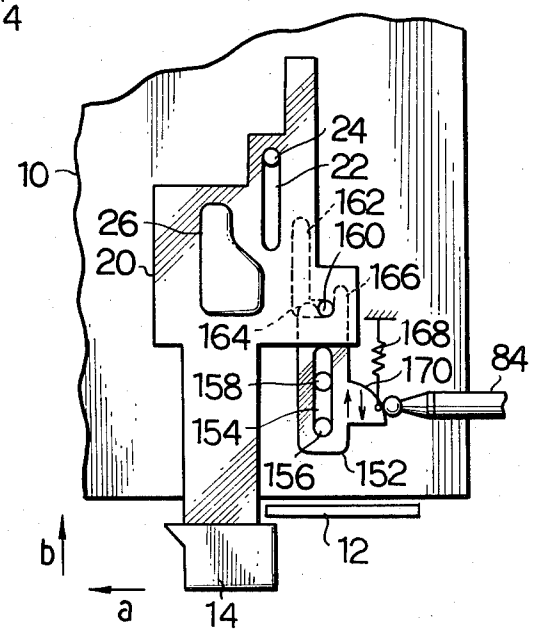


Fig. 9



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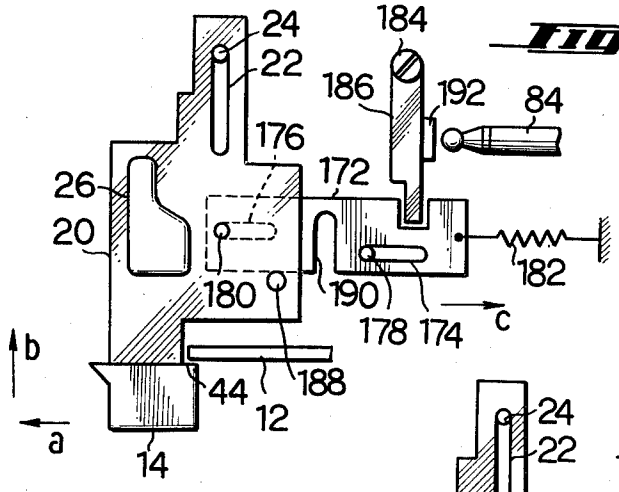

Fig - 10

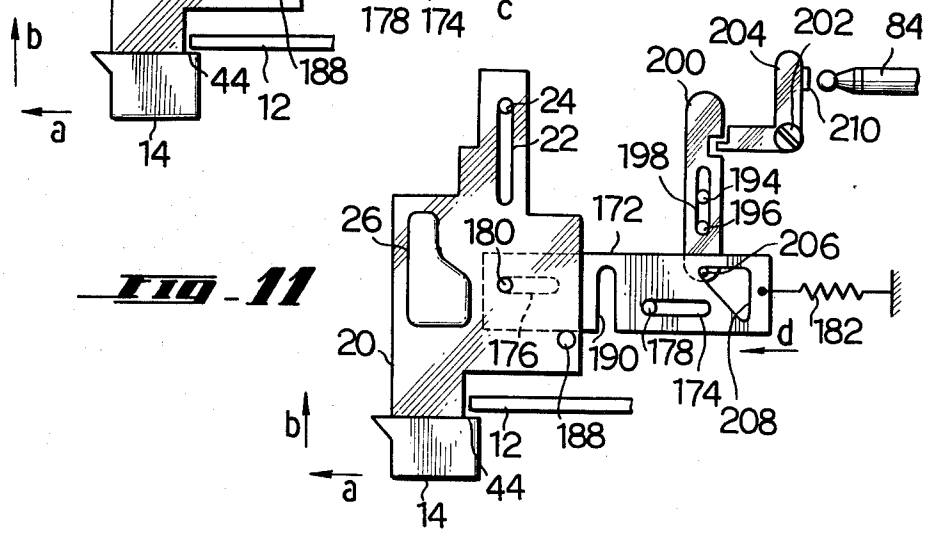

Fig - 11

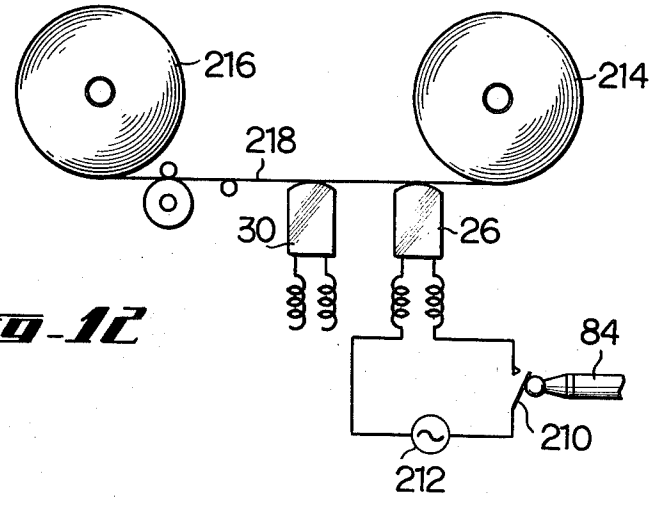

Fig - 12

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DEVICE USING A RECORDING JACK FOR PREVENTING ERASURE OF RECORDED INFORMATION FROM MAGNETIC TAPE IN A TAPE RECORDER

BACKGROUND OF THE INVENTION

Of late, the size of tape recorders has become smaller and smaller and depressable knobs as the operation mechanisms of such small size tape recorders have been also simplified. In consequence, the various depressable operation knobs are arranged in a closely spaced relation in such a small size tape recorder. However, because of such a closely spaced arrangement of the knobs, there is the possibility that, when an operator depresses the reproducing knob for reproducing information from a recorded magnetic tape, he might also depress the erasing knob unintentionally resulting in erasure of the information recorded on the magnetic tape. Especially, such erroneous depression is often seen when a tape recorder is operated in a dim light environment and/or manually maneuvered in a suit pocket.

For operating any of the conventional tape recorders including the above-mentioned small size tape recorders for recording or reproducing, a recording jack or a reproducing connector is first inserted into the jack or connector insertion opening provided in the tape recorder and then a suitable operation knob selected depending upon the kind of operation is depressed. However, if the jack or connector is not properly inserted in the tape recorder, any recording cannot be obtained on a magnetic tape or informations recorded on the tape cannot be perfectly erased which makes it impossible to properly record information on such an incompletely erased tape.

SUMMARY OF THE INVENTION

The present invention relates to a tape recorder and more particularly, to a device for such a tape recorder which prevents information recorded on a magnetic tape from being inadvertently erased.

One principal object of the present invention is to provide an improved and novel device for a tape recorder which can effectively prevent information recorded on a magnetic tape from being inadvertently erased due to erroneous operation and also prevent improper recording of information on a magnetic tape through erroneous operation.

The device of the present invention is characterized in that by the provision of the device in a tape recorder the erasing head of the tape recorder is actuated only when a recording jack has been perfectly inserted in the jack insertion opening provided in the recorder.

The device of the present invention is further characterized in that by the provision of the device in a tape recorder the locking mechanism for the erasing head is released only after a recording jack has been perfectly inserted in the jack insertion opening provided in the tape recorder whereby the erasing head is allowed to abut against a magnetic tape loaded in the tape recorder.

The above-mentioned recording jack may be in the form of a microphone jack which connects a microphone to a tape recorder or an auxiliary jack which connects a radio receiver to a tape recorder.

The above and other objects and attendant advantages of the present invention will be more readily apparent to those skilled in the art from a reading of the following detailed description referring to the accompanying drawings in which various different embodiments of devices of the invention are illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view of a tape recorder incorporating therein one of the devices of the invention which is adapted to prevent information recorded on a magnetic tape from being inadvertently erased;

FIG. 2 is a fragmentary schematic view of said tape recorder on an enlarged scale showing the constructions and arrangements of the erasing head recording and reproducing head and stop mechanisms of the tape recorder; and

FIGS. 3 to 12 inclusive are schematic views of various different forms of devices adapted to prevent information recorded on a magnetic film from being inadvertently erased embodying the present invention, respectively.

PREFERRED EMBODIMENTS OF THE INVENTION

The present invention will be now described referring to the accompanying drawings and more particularly, to FIG. 1 thereof in which a tape recorder which incorporates therein one of the devices of the invention.

The tape recorder generally comprising a casing **1** having an opening **2** in which a spring-loaded cassette loading deck **3** is movably received. The deck **3** is movable between a first position in which the exposed surface of the cassette loading deck is flush with the surface of one side wall of the casing **12** (the front side wall surface as seen in FIG. **1**) and a second position in which the exposed surface of a tape cassette (not shown) when loaded on the deck **3** is flush with the above-mentioned side wall surface of the casing **12**. When loaded on the deck **3**, the cassette on which a tape is carried is releasably held in its operative position by means of guide pins **8**, **9** and **10'** provided on the casing **12** at spaced points on the side wall of the casing opposite to and extending towards the first-mentioned side wall. The cassette loading deck **3** has openings **11**, **12'** and **13** through which the guide pins **8**, **9** and **10'** extend, respectively and the cassette also has openings (not shown) in alignment with the openings **11**, **12'** and **13** in the deck **3**, respectively and the pins **8**, **9** and **10'** also extend through the openings in the cassette when the cassette is loaded on the deck **3**. The deck **3** is normally urged to the first position by means of a spring (not shown). The pin **10'** is movable and normally biassed towards the pins **8** and **9** by means of a spring (not shown) so that the cassette is held in its operative position on the deck **3** by the cooperating pins **8**, **9** and **10'**when the deck is in the second position referred to above. A cassette release knob **22** is provided in the casing **1** and operatively connected to the pin **10'** in such a manner than when manipulated, the knob **22'** moves the pin **10'** away from the pins **8** and **9** against the force of the spring which urges the pin **10'** towards the pins **8** and **9**. As the pin **10'** moves away from the pins **8** and **9** in the

manner mentioned just above, the cassette is released from the holding force by the pin **10'** whereupon the cassette loading deck **3** is urged back to the first position carrying the cassette thereon by the spring and the cassette is then ready to be removed from the deck **3** and accordingly, from the tape recorder.

As seen in any of the conventional tape recorder, a capstan **17** extends from the rear side wall of the casing **12** (as seen in FIG. **1**) through an opening **15** in the deck **3** and an aligned opening (not shown) in the cassette when the latter is loaded on the deck. The capstan **17** is adapted to cooperate with a pinch roller (not shown) provided in the tape recorder casing **12** at a suitable position in the conventional manner in driving a tape (not shown) in the cassette when the cassette having the tape therein is held in the operative position on the deck **3**. Reel drive spindles **4** and **5** extend from the rear side wall of the casing **1** through corresponding openings **6** and **7** in the deck **3** and aligned openings (not shown) in the cassette when the latter is in its operative position. Thus, when the tape recorder is operated, the capstan **17** and pinch roll engage and drive the portion of the tape extending between the reels (not shown) in the cassette in one or the other direction depending upon the purpose for which the tape recorder is operated.

An erasing knob **14** for actuating an erasing head (not shown), a recording and reproducing knob **16** for actuating a recording and reproducing head (not shown) and a stop knob **18** for rendering the recording knob **14** and/or the recording and reproducing knob **16** inoperative are operatively received in an opening **19** provided in the casing **1** opposite to an opening **2** in which the cassette loading deck **3** is received. A volume control knob **21'** is also provided in one end wall of the casing **1** (the left end wall as seen in FIG. **1**) at a point below the opening **2** and an electric power supply source **23** is detachably connected to the casing **1** in the manner as shown in FIG. **1**.

FIG. **2** of the accompanying drawings shows in detail the constructions and arrangements of the erasing head, recording and reproducing head and stop mechanisms of the tape recorder of FIG. **1**.

A chassis C is provided within the casing **12** extending transversely of the interior of the casing to divide the depth of the interior into two compartments.

The erasing knob **14** is mounted on a sliding lever **20** having the shape as shown which is provided with an elongated slot **22** therein and carries a magnetic erasing head **26**. The slidable erasing lever **20** is adapted to slidably move along a guide pin **24** provided in chassis C. The slidable lever **20** is normally urged outwardly by a compression spring **42** one end of which is anchored to the lever while the other end of which is anchored to the casing **1**. The recording and reproducing knob **16** is secured to a slidable recording and reproducing lever **28** on which a recording and reproducing head **30** is mounted and the lever is provided with an elongated slot **32** through which a guide pin **34** secured to the chassis **10** extends. Thus, the slidable lever **28** is adapted to slidably move along the pin **34**. Although not shown, the slidable lever **28** is also normally urged outwardly by a compression spring anchored at the opposite ends to the lever and chassis. The stop knob **18** is mounted on slidable lever **36** which is provided with an elongated slot **38** through with a guide pin **40** secured to the chassis **10** extends and thus, the lever is slidably moved along the pin **40**. The slidable lever **36** is also normally urged outwardly by a compression spring (not shown) which is anchored at the opposite ends to the lever and casing. The spring **42** extending between the slidable lever **20** and casing **12** also urges to pivot the erasing knob **14** about the pin **24** in the counterclock wise direction (as seen in FIG. **2**) to cause a shoulder **44** on the knob **14** to abut against the casing **12**. In this position, the recording knob **14** cannot be depressed in the arrow direction *b* in FIG. **2**.

A L-shaped lever **50** is provided between the slidable lever **28** on which the recording and reproducing head **30** is mounted and the slidable lever **36** on which the stop knob **18** and the lever **50** is pivoted to the chassis **10** by pivot pin **52**. A spring **53** extends between one arm of the L-shaped lever **50** and the chassis C and thus, the lever **50** is adapted to be biassed about the pin **52** in the clockwise direction (as seen in FIG. **2**). The other arm of the L-shaped lever **50** is provided with a rim **54** bent at right angles to the remaining portion of the associated lever arm which rim is normally urged against the adjacent side edge of the sliding lever **28**. When the recording and reproducing knob **16** is depressed in the arrow direction *b* in FIG. **2** so as to slide the lever **28** on which the knob **16** is mounted in the same direction until the rim **54** of the L-shaped lever **50** engages a step **56** in the side edge of the lever **28** whereupon the lever **28** is locked in this position. Then, when the stop knob **18** is depressed in the arrow direction *b* until a projection **58** formed with the slidable lever **36** on which the stop knob **18** is mounted engages and pushes a rim **60** which is formed with the first-mentioned arm of the lever **50** at right angles to the remaining portion of the associated lever arm whereupon the L-shaped lever **50** is pivoted about the pin **52** in the counterclock wise direction and as a result, the rim **54** disengages from the stop **56** and the lever **28** and the recording and reproducing knob **18** mounted thereon are returned to their initial position. The slidable lever **28** has one end of a rocking bar **64** pivoted thereto by means of a picot pin **62** and the other end of the rocking bar **64** is adapted to engage and actuate a switch **68** leading to an amplifier circuit and a control circuit (not shown). The rocking bar **64** is also pivoted at a midpoint **66** between the opposite ends to the chassis C.

In the operation of the above-mentioned tape recorder, the erasing knob **14** is first displaced in the arrow direction *a* so as to disengage its shoulder **44** from the casing **1** until a projection of nose **46** on the knob **14** engages a notch **48** in the recording and reproducing knob **16**. Thereafter, the knobs **14** and **16** which are in engagement with each other by means of the projection **46** and notch **48** thereof are depressed in the arrow direction *b* until the magnetic erasing head **26** and magnetic recording and reproducing head **30** abut against the magnetic tape (not shown) which is received in the cassette. On the other hand, when the tape recorder is operated for reproduction, only the recording and reproducing knob **16** is depressed until the magnetic recording and reproducing head **30** abuts against the tape.

FIGS. 3 to 5 inclusive illustrate a first or preferred form of device according to the present invention which is adapted to prevent informations recorded on a magnetic tape from being inadvertently erased. The illustrated device generally comprises two superposed plates **80** and **82**. In FIG. **3**, a microphone jack **84** as a recording jack is shown in a position in which the jack is not fully inserted in a jack insertion opening formed in the tape recorder (not shown). The upper or front plate **80** (as seen in FIGS. **3** to **5**) is provided with an elongated slot **86** (FIG. **5**) and a rim **90** on one side which is bent at right angles to the remaining portion of the plate **80**. The innermost portion **88** of the above-mentioned slidable lever **20** on which the erasing head **26** is mounted is adapted to abut against the rim **90**. The lower or rear plate **82** (as seen in FIGS. **3** to **5** inclusive) is also provided with an aligned elongated slot **92** the position and size of which correspond to those of the slot **86** in the plate **80** and the plate **82** has at one end a rim **94** disposed at right angles to the remaining portion of the plate **82** and a rim **96** on one side disposed at right angles to the remaining portion of the plate **82**. The leading end of the microphone jack **84** is adapted to abut against the rim **94** when the jack is inserted in the jack opening and the rim **96** is adapted to engage the adjacent side edge of the plate **80**. The plates **80** and **82** referred to just above are clearly shown in an exploded state in the perspective view of FIG. **5**. The aligned slots **86** and **92** in the plates **80** and **82** receive therein a guide pin **100** having a reduced diameter projecting stopper **98** and a conventional pin **102** which pins extend from the chassis **10**. The length of the stopper **98** corresponds to the thickness of the plate **80** and the length of the larger diameter pin **100** corresponds to the thickness of the plate **82**, respectively. The plate **82** is normally biassed in the arrow direction *c* by means of spring **104** extending between the plate **82** and chassis **10**. The plate **80** is normally biassed by component forces both in the arrow direction *c* and counterclock wise direction and the bias of the plate **80** in the arrow direction *c* is limited by the rim **94** of the plate **82**. In the position of the plates **80** and **82** as shown in FIG. **3**, the erasing knob **14** can be disengaged from the casing **12** by displacing the knob in the arrow direction *a* (FIG. **3**), but the knob **14** cannot be pushed in the arrow direction *b* together with the recording and reproducing knob **16** because the innermost portion **88** of the lever **20** is in abutment against the rim **90** of the plate **80**. In this position of the erasing knob **14**, the erasing head **26** cannot be abutted against the magnetic tape and accordingly, information recorded on a magnetic tape may not be erased.

FIG. **4** shows the microphone jack **84** in its fully inserted position in the jack insertion opening in the tape recorder (not shown). When the microphone jack **84** is inserted in this way, the plates **80** and **82** are displaced in the arrow direction *d* against the force of the spring **104** and at the same time, the innermost portion **88** of the slidable lever **20** disengages from the rim **90** so that the plate **80** will be allowed to pivot about the pin **102** by a small distance in the counterclock wise direction. As the plate **80** pivots in the manner mentioned above, the rim **96** of the plate **82** contacts a nose **108** provided in the plate **80** and as a result, even the plate **82** is biassed in the arrow direction *c* by the spring **104** the microphone jack can be effectively prevented from being slipping out of the jack insertion opening. In other words, even when the force of a self-holding spring force applied on the jack **84** decreases due to any prolonged use of the jack, the jack will not be pushed back thereby to eliminate any insufficient contact with the plate assembly **80**, **82**. After the microphone jack **84** has been fully inserted in the jack insertion opening in this manner, the locking mechanism which prevents information recorded on a magnetic tape from being inadvertently erased is released, the slidable lever **20** and accordingly, the erasing head **14** mounted thereon can be depressed inwardly and the recording and reproducing head **30** and erasing head **26** (FIG. **2**) are allowed to abut against the magnetic tape in the cassette whereby a desired recording can be made.

When the microphone jack **84** is pulled out of the jack insertion opening (not shown), the plate **82** is first allowed to return to its initial position by the force of the spring **104** whereupon the rim **96** of the plate **82** engages and pushes the nose **108** on the plate **80** and thus, the plate **80** is caused to pivot about the pin **102** in the clockwise direction to the initial position as shown in FIG. **3** in which the slots **86** and **92** in the plates **80** and **82** are aligned with each other. As far as the microphone jack is not inserted in the jack insertion opening, the levers **20** and **28** are maintained in their locked position and there will be no possibility that information recorded on the tape will be inadvertently erased or the tape is inadvertently recorded informations thereon.

FIG. **6** illustrates a modified embodiment of device according to the invention which prevents information recorded on a magnetic tape from being inadvertently erased. The modified device utilizes an electromagnet in the locking mechanism. The innermost portion **88** of the slidable lever **20** is engaged and locked by one arm **114** of a control lever **112** which is pivoted at **110** to the chassis **10**. A spring **118** extends between the other arm **116** of the control lever **112** and chassis **10** so that the control lever may be pivoted about the pin **110** in the counterclock wise direction. Reference numeral **120** denotes an electromagnet to be energized from a voltage source **122**. When the switch **124** is thrown in by the insertion of the microphone jack **84** into the jack insertion opening, simultaneously, the device is set into operation. The voltage source **120** may be concurrently used as the power source for driving the tape recorder. When the jack **84** is not inserted in the jack insertion opening, the electromagnet **120** is not energized and accordingly, the lever **20** cannot be depressed in the arrow direction *b* because the lever **20** is engaged and locked by the arm **114** of the control lever **112**. As mentioned above, when the microphone jack **84** is inserted into the jack insertion opening and the switch **124** is thrown in, the electromagnet **120** is energized. The energized magnet **120** attracts the arm **116** of the lever **112** outwardly against the force of the spring **118** whereupon the arm **114** of the control lever **112** is disengaged from the innermost portion **88** of the lever **20** so as to release the lever **20** from its locked position whereby the erasing head **26** can be depressed towards the magnetic tape in the cassette if the tape cassette is loaded on the deck **3** and consequently, the above-

mentioned recording operation can be effected. In this modified embodiment of device, a pin **126** is secured to the chassis **10** and the pin is adapted to limit the movement of the control lever in the counterclock wise direction. The purpose of the limitation of the movement of the control lever **112** in the counterclock wise direction is that if such movement is not limited, when the microphone jack **84** is pulled out of the jack insertion opening with the erasing knob **14** maintained in its depressed position the control lever **112** pivots about the pin **126** to an undesirably excess amount and consequently, when the erasing knob **14** is then returned to its initial position the arm **114** of the control lever **112** may not properly align with the innermost portion **88** of the lever **20**.

FIG. **7** illustrates a further modified embodiment of device according to the invention. In this modified device, the innermost portion **88** of the erasing lever **20** is engaged and locked by a rim **137** at the end of one arm **134** of a control lever **132** pivoted at **130** to the chassis **10** and the other arm **138** of the lever **132** is biassed about a pin **130** secured to the chassis **10** in the clockwise direction by a spring **138** extending between the lever arm and chassis. In this position of the lever **20**, the lever cannot be displaced in the arrow direction *a* because its innermost portion **88** is engaged and locked by the rim **137** and accordingly, the shoulder **44** of the erasing knob **14** which is depressed when a recording is made will not disengage from the casing **1** and the knob **14** cannot be depressed in the arrow direction *b*. When the microphone jack **84** is further pushed leftwards to its full insertion position in the jack insertion opening, the innermost portion **88** of the lever **20** is disengaged from the rim **137** on the arm **134** of the control lever **132**. As a result, the erasing knob **14** may be displaced in the arrow direction *a* so as to disengage the shoulder **44** from the casing **1** whereby the knob can be depressed in the arrow direction *b* and a desired recording can be made. Also in this modified embodiment of device, the movement of the control lever **132** in the clockwise direction is limited by a pin **139** secured to the chassis and the function of the pin **139** is identical with the pin **126** explained in connection with the device of FIG. **6**.

FIG. **8** illustrates a still further modified embodiment of device of the invention. The lever **20** employed in this modified device is somewhat different from the corresponding lever in the preceding embodiments of devices of FIGS. **3** to **7** inclusive. As clear from this Figure, the locking mechanism comprises a control lever **142** pivoted to the chassis **10** by a pivot pin **140** which is in turn secured to the chassis **10**. One arm of the lever **142** has a rim **144** provided at the free end at right angles to the remaining portion of the arm and the lever **20** is provided at the outer edge with a rim **146** at right angles to the remaining portion of the lever **20** for engagement with the rim **144**. A spring **148** extends between the arm of the control lever **142** and chassis **10** for normally biassing the control lever **142** about the pin **142** in the clockwise direction. Accordingly, in this position of the parts of FIG. **8**, the erasing knob **14** mounted on the lever **20** cannot be displaced in the arrow direction *a* and a recording cannot be effected. However, as the microphone jack **84** is fully inserted into the jack insertion opening (not shown), the control lever **142** is pivoted about the pin **140** in the counterclock wise direction against the force of the spring **148** and the rim **144** disengages from the rim **146** on the lever **20** and as a result, the shoulder **44** on the erasing knob **14** disengages from the casing **12** so that the knob **14** can be depressed in the arrow direction *b* whereupon the tape recorder is ready for recording operation.

In the device of FIG. **8**, the movement of the control lever **142** in the clockwise direction is limited by a pin **150** secured to the chassis. The reason for which such movement of the control lever is limited is that if the control lever is not limited in the clockwise movement, as the microphone jack **84** is pulled out of the jack insertion opening with the erasing knob **14** maintained in its depressed position, the control lever would pivot about the pin **140** to an undesirably excess amount by the pulling force of the spring **148** and when the erasing knob **14** is thereafter returned to its initial position the rim **144** of the control lever would not properly align with the rim **146** of the lever **20**.

FIG. **9** illustrates a still further modified embodiment of device of the invention and and in this embodiment the locking mechanism includes a control plate **152** disposed between the lever **20** and chassis **10**.

The control plate **152** has an elongated slot **154** in the center and one or inner end of the plate is bifurcated so as to provide arms of different lengths **164** and **166**. The longer arm **166** is provided on one side or the outer side with a sector-shaped projection **170**. The inner end portions of the arms **164** and **166** receive therebetween a guide pin **160** extending from the lever **20** and the inner end portions of the arms are smoothly curved on their inner or opposite sides so that the control plate **152** may be smoothly guided along the pin **160**. The sector projection **170** is arcuated on the side directing to the bifurcated end of the plate **152**.

The pin **160** on the lever **20** is adapted to be guided along a L-shaped slot **162** formed in the chassis **10** as the lever is moved relative to the chassis. The movement of the pin is stopped when the pin is received within the space defined by the free end portions of the control plate **152**. Reference numeral **168** denotes a spring a having predetermined biassing rating and the spring normally biasses the control plate **152** in the dotted arrow direction.

With the construction and arrangement of the device of FIG. **9**, when the sector portion **170** is pushed inwardly by the leading end of the microphone jack **84** as the actuating member as the jack is inserted into the jack insertion opening in the casing **12**, the jack is caused to slidably move along the arcuated side of the sector projection **170**. As a result, the sector projection **170** and accordingly, the control plate **152** is displaced in the full line arrow direction against the force of the spring **168**. After the jack **84** has been fully inserted into the jack insertion opening and the control plate **152** has been displaced to a predetermined position, the inner end portion of the shorter arm **164** is moved out of its alignment with the L-shaped slot **162** in the chassis **10** and the arm will release the guide pin **160** secured to the lever **20** from its locked position.

Thus, the lever **20** pushes the erasing knob **14** in the arrow direction *a* and accordingly, the pin **160** on the lever **20** is guided along the L-shaped slot **162** in such a manner that the lever **20** and the adjacent lever **28** may be set in a position ready for recording.

With the above-mentioned operation for recording, the tape recorder can positively and smoothly function eliminating the possibility of inadvertent erasing and/or improper recording.

FIG. **10** illustrates a still further modified embodiment of device according to the invention and in this embodiment, the locking mechanism comprises a control plate **172** and a rocking lever **186**, for example. The control plate **172** is slidable in the space between the lever **20** and chassis **10**. The control plate **172** has two spaced elongated slots **174** and **176** and the slot **174** receives a pin **178** secured to chassis **10** while the slot **176** receives a pin **180** secured to the chassis **10**. A compression spring **182** extends between the control plate **172** and chassis **10** for normally biassing the plate **172** in the arrow direction *c*. In the position of the microphone jack **84** shown in FIG. **10** in which the microphone jack **84** is separated from an electrically insulated abutment portion **192** of the rocking lever **186** which is pivoted to the chassis **10** by a pivot pin **184**, the erasing knob **14** can be displaced in the arrow direction *a*, but the knob cannot be depressed in the arrow direction *b* because the outer side edge of the control plate **172** is engaged by a pin **188** extending from the lever **20**. Therefore, in this position of the control plate **172** the erasing knob **14** cannot be operated. However, when the jack **84** is pushed inwardly to abut against the portion **192** so as to rock the lever **186**, the rocking lever **186** slidably moves in the arrow direction *d* against the force of the spring **182**. As the rocking lever **186** is displaced in the manner mentioned above, the erasing knob **14** is displaced in the arrow direction *a* until the shoulder **44** on the erasing knob **14** disengages from the casing **12** whereupon the pin **188** is received in a slot **190** formed in the control plate **172** so that the erasing knob **14** may be depressed in the arrow direction *b* ready for recording operation.

FIG. **11** illustrates a modification of the device as shown in FIG. **10**. As clear from this Figure, the device of FIG. **11** is different from that of FIG. **10** only in the fact that a different drive mechanism for the control plate **172** is employed The drive mechanism of FIG. **11** comprises a rocking lever **200** having an elongated slot **198** through which a pair of guide pins **194** and **196** secured to the chassis C extend and a L-shaped lever **204** pivoted to the chassis **10** by a pivot pin **202**. In the position of the microphone jack **84** shown in FIG. **11** in which the jack **84** is separated from the L-shaped lever **204**, the lever **20** cannot be displaced in the arrow direction *a* because the outer side edge of the control plate **172** is engaged by the pin **188** extending from the lever. However, when the microphone jack **84** is further inserted deep into the jack opening until the jack abuts against an electrically insulated portion **210** on one arm of the L-shaped lever **204**, the lever **204** is pivoted so as to move the other arm of the lever **204** outwardly. As the other arm of the lever moves outwardly in the manner mentioned above, the arm pushes the plate **200** outwardly until a pin **206** on the outer end portion of the plate **200** abuts against the ramp of a triangular opening **208** formed in the control plate **172** whereupon the control plate **172** is slidably displaced in the arrow direction *d* against the force of the spring **182**. As the control plate **172** is displaced in the manner mentioned just above, the erasing knob **14** is displaced in the arrow direction *a* as mentioned in connection with FIG. **10** until the shoulder **44** on the knob disengages from the casing **12** and the pin **188** is received in the slot **190**. Thereafter, when the erasing knob **14** is depressed in the arrow direction *b*, a desired recording can be effected.

FIG. **12** illustrates a still further modified embodiment of device according to the invention and in this embodiment the erasing head employed is in the form of an electromagnetic head **26** and a switch **210** is provided in the electric circuit to the head **26**. In the device of this Figure, when the arrangement is so made that only when the microphone jack **84** is fully inserted into the jack insertion opening the switch **210** is closed so as to connect the erasing head **26** to an erasing signal generator **212**, as far as the jack **84** is not inserted into the jack insertion opening, informations recorded on the magnetic tape **218** wound on the tape reels **214** and **216** will not be inadvertently erased and accordingly, even if the erasing knob **14** connected to the erasing head **26** is inadvertently depressed and the head abuts against the tape **218**, informations recorded on the tape will not be erased.

It is clear that in any of the foregoing embodiments of the devices according to the invention the rim on the control plate against which the leading end of the microphone jack abuts and the ends of the various levers must be electrically insulated. The present invention is in no way limited to the precise embodiments described hereinabove, but rather various modifications and changes may be resorted to on them. For example, when any of the devices mentioned hereinabove is employed in conjunction with a tape recorder which records from a radio, television or gramaphone record and has a separate insertion plug opening other than a microphone jack insertion opening, a recording jack may be integrally formed with the microphone jack and in such a case, the recording jack is locked in position with a spring force greater than that of the spring provided in the locking mechanism. Any of the above-mentioned devices of the invention can be equally employed when a recording and reproducing connector is employed for connection between an amplifier and a tape recorder.

As mentioned above, any of the devices described hereinabove is so designed that only after the microphone jack has been fully and properly inserted into the jack insertion opening the erasing head is actuated and therefore, information recorded in the magnetic tape would not be inadvertently erased even if the erasing head is erroneously actuated and improper recording due to insufficient insertion of the microphone jack into the jack insertion opening can be effectively prevented.

While several embodiments of the invention have been shown and described in detail it will be understood that the same are for illustration purpose only and are not to be taken as a definition of the invention and that various modifications and changes on the same will be easily occurred to those skilled in the art without departing and within the scope of the invention as defined in the appended claims.

We claim:

1. In a tape recorder having a chassis, apparatus for preventing the accidental erasure of information previously recorded on tape in said recorder, which comprises:

a first, spring-biassed lever, slidably movable, on said chassis inwardly towards said tape, spring bias normally urging said lever outwardly away from said tape;

a record/reproduce head mounted to said first lever and engaging said tape when said first lever is moved inwardly towards said tape;

a second, spring-biassed lever, slidably movable, on said chassis, inwardly towards said tape about a pivot point permitting limited rotational movement, spring bias normally urging said second lever outwardly away from said tape;

an erase head mounted to said second lever and engaging said tape when said second lever is moved inwardly towards said tape;

a first projection on said recorder engaging a recess on said second lever to inhibit movement thereof towards said tape when said movement is directed along a path substantially normal to said tape, said projection having a dimension such that when said movement is combined with limited rotation of said lever, about said pivot point, the projection fails to intercept said recess, thereby permitting said erase head to contact said tape;

a second projection on said second lever, for mating engagement with a corresponding recess in said first lever, said second lever, when moved, and simultaneously rotated about said pivot point, to bring said erase head into engagement with said tape, moving said first lever, and hence said record/reproduce head into contact with said head;

a spring-biassed third lever, engaging a detent on said first lever, for locking said first lever when moved inwardly towards said tape;

means for rotating said third lever out of engagement with said detent to release said first lever so that it may move said record/reproduce head out of engagement with said tape under spring-bias action; and

inhibiting means, responsive to the insertion of a microphone jack into an aperture of said recorder, for inhibiting rotation of said second lever, and hence the recording of said erase head inwardly towards said tape, full and complete insertion of said jack moving said inhibiting means to permit rotation of said second lever and hence the recording of new information on said tape.

2. The apparatus according to claim 1, wherein said second lever has rearwardly extending extension and said inhibiting means comprises:

a first elongated plate having an elongated central slot therein, a first upwardly extending portion at one end thereof, and a second upwardly extending portion along one side thereof, proximate said first upwardly extending portion;

a second elongated plate having a second, elongated, central slot therein, co-extensive with the elongated slot in said first plate, a curved nose at one end of said second plate for engagement with the first extending portion of said first plate, and a third upwardly extending portion at the other end thereof for engagement with the rearwardly extending extension on said second lever, to inhibit rotation of said second lever;

a first pin extending from said chassis through the elongated slots in said first and second plates;

a second pin, having a portion of reduced diameter, extending through said elongated slots in said first and second plates, said first and second pins restraining said first plate for only lateral displacement, the reduced diameter of the second pin permitting limited rotation of said second plate, in addition to lateral displacement;

first spring means for biassing said first plate towards said aperture in said recorder; and

second spring means for biassing said second plate so that said third upwardly extending portion engages said rearwardly extending extension on said second lever, full and complete insertion of said microphone jack causing the first upwardly extending portion of the first plate to bear against the curved surface of said nose, thereby displacing, and rotating, said second plate, between said second pin and the second upwardly extending portion of the first plate, to move the third upwardly extending portion of the second plate out of engagement with the rearwardly extending extension of said second lever, permitting rotation of same, and engagement of the erase head with the tape.

3. The apparatus according to claim 1. wherein said second lever has a rearwardly extending extension and said inhibiting means comprises:

a third lever, pivotally mounted to said chassis, and having an extension at one end thereof for engaging the rearward extension of said second lever to inhibit rotation of the latter;

spring means for biassing said third lever into engagement with said second lever;

electromagnet means for attracting the other end of said third lever and rotating the same about the pivot thereof, against said spring bias, and disengage said third and said second levers;

electrical switch means, actuated by the full and complete insertion of said microphone jack, for energizing said electromagnet means, thereby permitting rotation of said second lever and engagement of said erase head with said tape.

4. The apparatus according to claim 1, wherein said second lever has a rearwardly extending extension and said inhibiting means comprises:

a fourth, L-shaped lever, pivotally mounted to said chassis rearwardly of said second lever, said fourth lever having a forward extension at one end thereof engaging a side surface of said rearwardly extending extension to inhibit rotation of said second lever;

third spring means for biassing said fourth lever into engagement with said second lever; and

a pin for limiting rotation of said fourth lever in the direction of the bias of said third spring means, insertion of said microphone jack rotating said fourth lever, about the pivot thereof, out of engagement with said second lever and permitting rotation thereof and engagement of said erase head with said tape.

5. The apparatus according to claim 1, wherein said second lever has a forwardly extending extension and said inhibiting means comprises:

a fifth L-shaped lever, pivotally mounted to said chassis forwardly of said second lever, said fifth lever having a rearward extension at one end

thereof engaging a side surface of said forwardly extending extension, to inhibit rotation of said second lever;

fourth spring means for biassing said fifth lever into engagement with said second lever; and

pin means for limiting rotation of said fifth lever in the direction of the bias of said fourth spring means, insertion of said microphone jack rotating said fifth lever, about the pivot thereof, out of engagement with said second lever and permitting rotation thereof and engagement of said erase head with said tape.

6. The apparatus according to claim **1**, wherein said second lever has a downwardly extending pin, and said inhibiting means comprises:

a rearwardly extending member having an elongated central slot therein, an arcuate surface on one end thereof constituting a cam, and a bifurcated portion including two tines, receiving said downwardly extending pin, at the other end thereof, said tines being of unequal length;

a pair of upwardly extending pins on said chassis, engaging said elongated slot in said rearwardly extending member, and limiting same to motion normal to the plane of said tape; and

fifth spring means for biassing said member rearwardly to capture said downwardly extending pin in said bifurcation and inhibit rotation of said second lever, complete insertion of said microphone jack engaging said cam and forcing said member forward, permitting said downwardly extending pin to travel over the surface of the shorter one of said tines, and escape from said bifurcation thus permitting said second lever to rotate and bring said erase head into engagement with said tape.

7. The apparatus according to claim **1**, wherein said second lever has a downwardly extending pin mounted proximate the front end thereof, and said inhibiting means comprises:

a rectangular plate having a pair of elongated longitudinal slots therein, a first transverse slot for engagement with said downwardly extending pin, and second transverse slot on the opposite side of said plate from said first transverse slot;

a pair of pins extending from said chassis and engaging said longitudinal slots to limit the travel of said plate to a direction which is normal to the direction of travel of said second lever;

sixth spring means for biassing said plate towards the aperture through which said microphone jack is inserted, the edge of said plate contacting said downwardly extending pin and inhibiting rotation of said second lever; and

an actuating member having one end pivoted to said chassis, the other end thereof being inserted in said second transverse slot, complete insertion of said microphone jack rotating said actuating member about the pivot thereof and, in turn, moving said plate against the bias of said sixth spring means, whereby said downwardly extending pin enters said first transverse slot thereby permitting rotation of said second lever and engagement of said erase head with said tape.

8. The apparatus according to claim **7**, wherein said plate has a triangular aperture therein, said actuating member has an elongated central slot therein, a recess at the upper end thereof, and an upwardly extending pin at the other end thereof engaging said triangular aperture, and the apparatus further comprises:

a sixth L-shaped lever pivoted to said chassis, one end thereof engaging the recess in said actuating member, complete insertion of said microphone jack engaging the other end of said sixth L-shaped lever, rotating same to displace said plate against said spring bias, thereby permitting said second lever to rotate.

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